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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/052,347	01/23/2002	Katsuhide Manabe	P 282475 F00-219-USdiv3-c	4113

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Pillsbury Winthrop LLP  
Intellectual Property Group  
1600 Tysons Boulevard  
McLean, VA 22102

EXAMINER

MULPURI, SAVITRI

ART UNIT

PAPER NUMBER

2812

DATE MAILED: 05/17/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.  
10/052,347

Applicant(s)  
Manabe et al

Examiner  
Savitri Mulpuri

Art Unit  
2812



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on Jan 23, 2002
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 19-52 is/are pending in the application.
- 4a) Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 19-52 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120.

- 13) ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some\* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☒ Certified copies of the priority documents have been received in Application No. 09/926,022.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\*See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 2 6) ☐ Other:

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### DETAILED ACTION

This application is continuation of previous application 09/677,781, filed on 10/2/2000.

#### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 19-22, 25-26, 28-29, 31-32, 34-35 are rejected under 35 U.S.C. 102(b) as being anticipated by Khan et al..

Kahn et al discloses a method growing epitaxial layers by the following process steps: Providing a sapphire substrate; growing buffer layer of AlN; and then growing a gallium nitride compound layer on AlN buffer layer, wherein gallium nitride compound layer is AlGa<sub>N</sub> layer. Kahn et al discloses AlGa<sub>N</sub> layer with n-type dopant concentration approximately at  $10^{18}/\text{cm}^3$ . Kahn et al does not explicitly teach conductivity (1/resistivity). However, since Khan et al teaches the concentration of the n-type dopants is with the limit as of the claimed concentration, inherently the conductivity in the Khan et al must be met with in the claimed range from 3.4 /ohm-cm to 130 /ohm cm. Khan et al does not exemplify the dopant are n-type dopants. However, silicon is the most common and preferred element in the gallium nitride compound semiconductor materials.

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***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 23,24,27,30, 33,36, 45-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Khan et al in combination with Amano et al.

Kahn et al discloses a method growing epitaxial layers by the following process steps:

Providing a sapphire substrate; growing buffer layer of AlN; and then growing a gallium nitride compound layer on AlN buffer layer, wherein gallium nitride compound layer is AlGaN layer.

Kahn et al discloses AlGaN layer with n-type dopant concentration approximately at  $10^{18}/\text{cm}^3$ .

Kahn et al does not explicitly teach conductivity (1/resistivity). However, since Khan et al teaches the concentration of the n-type dopants is with the limit as of the claimed concentration,

inherently the conductivity in the Khan et al must be met with in the claimed range from 3.4 /ohm-cm to 130 /ohm cm. Khan et al does not exemplify the dopant are n-type dopants.

However, silicon is the most common and preferred element in the gallium nitride compound semiconductor materials.

Khan et al teach a method of making light emitting device same as instantly claimed process except (1) growing GaN instead of AlGaN, (2) growing AlN buffer layer at low temperature than the temperature to grow GaN or AlGaN .

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Amano teaches growing GaN layer at a temperature of 1040 C on AlN buffer layer, which is grown at 600 C. It would have been obvious to one of ordinary skill in the art to grow active layer of GaN or AlGaN at higher temperature than the growth temperature of buffer layer because Amano et al teaches growing buffer layer at lower temperature than GaN layer reduce crystal defects in the active gallium nitride semiconductor layer.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to S. Mulpuri whose telephone number is 305-5184. The fax phone number for the organization where this application or proceeding is assigned is 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 308-0956.

  
**SAVITRI MULPURI**  
**PRIMARY EXAMINER**